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ABSTRACT

This study was conducted to determine the effect on achievement and attendance of providing students with computer assisted instruction (CAI) progress reports. Subjects included 105 at-risk eleventh graders in a remedial program funded by Holiday Inn. In a 5-week period during the summer, subjects were required to attend 5 CAI instructional sessions delivered by a WICAT S-300 computer system. Subjects studied mathematics, language, and reading CAI lessons. They were randomly assigned to either the report or the no-report group. Reports were provided individually, and the no-report group was unaware of the availability of reports. Math calculation tests served as the achievement dependent variable. Course completion served as the attendance dependent variable. Achievement data ANOVA revealed a significant difference between the report and no-report groups. Analyses of attendance data revealed that providing students with reports increased course completion rates across all levels of ability and locus of control. This study provides empirical support for the often advised practice of providing students with CAI progress reports. (2 references) (GL)

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Progress Reports Improve Students' Course Completion Rate and Achievement in Math Computer-Assisted Instruction

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Abstract

What is the effect on achievement and attendance of providing students with CAI progress reports? Subjects (Ss) included 105 at-risk eleventh graders in a summer remedial program funded by Holiday Inn. Seventeen Ss were omitted from the study due to lack of pretest data. In a five weeks period during the summer, Ss were required to attend 5 CAI instructional sessions delivered by a WICAT S-300 computer system. Ss studied math, language, and reading CAI lessons. Ss were randomly assigned to either the report group or the no-report group. Reports were provided individually, the no-report group was un-aware of the availability of reports. Math calculation tests served as the achievement dependent variable. Course completion served as the attendance dependent variable.

Achievement data ANOVA revealed a significant difference between the report (mean 29.5) and no-report (mean 24.1) groups, p=.004, F= 2.78. Probit (and Logit) analyses of attendance data revealed that providing students with reports increased course completion rates across all levels of ability and locus of control. This study provides empirical support for the often advised practice of providing students with CAI progress reports.

A paper presented at the Annual Meeting of the Mid-South Educational Research Association, November 8, 1989, in Little Rock, Arkansas.

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Progress Reports Improve Students' Course Completion Rate and Achievement in Math Computer-Assisted Instruction

by Roy B. Clariana and Lana J. Smith

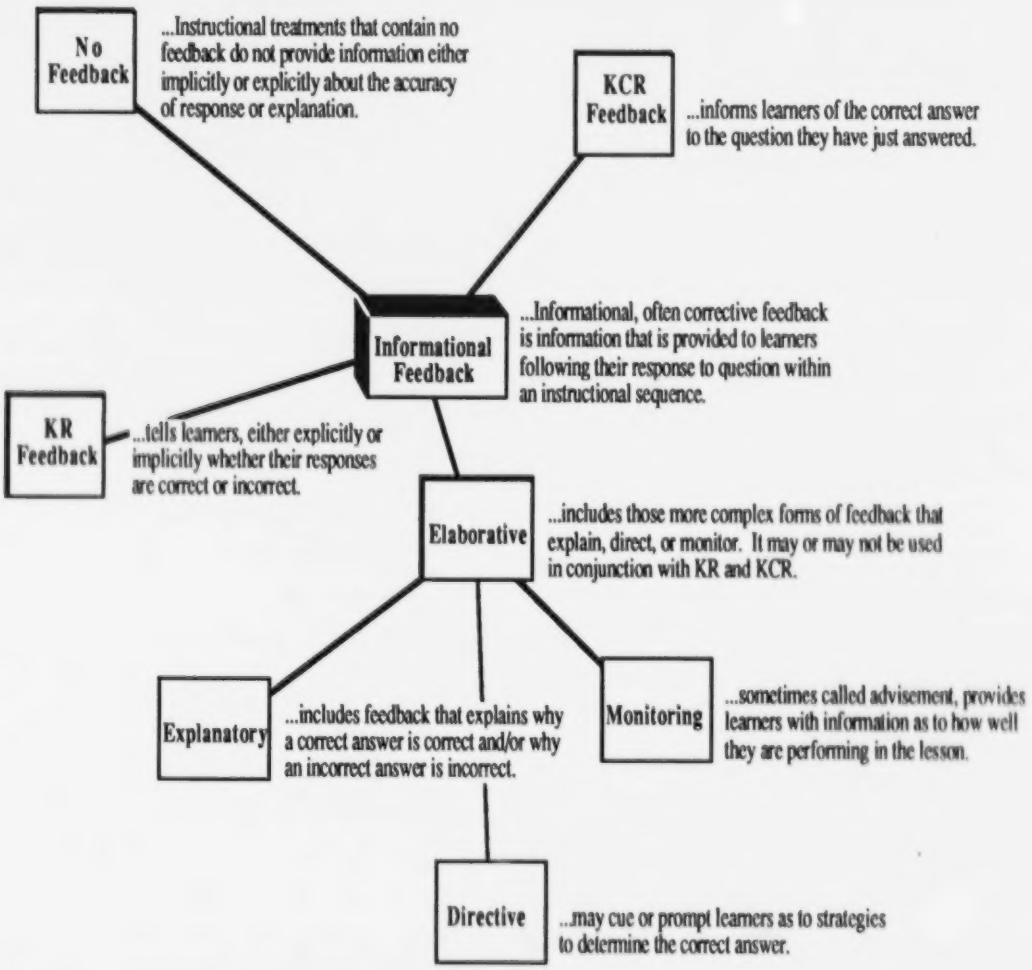
In computer-assisted instruction (CAI), extensive data on student progress can be easily and automatically collected. Nearly all writers advocate the use of progress reports in CAI (Alessi and Trollip, 1985), but little research is cited to support this assertion.

Smith (1988) described the relationship between different forms of feedback (figure 1). She argues that feedback contains information that allows the learner to correct errors. Information given about a specific item is microlevel feedback. For example, a teacher reviews homework items in class while the students check their own paper. Macrolevel feedback is feedback that is holistic or general rather than item specific. For example, telling a student that their test score is 86% is macrolevel feedback. Report cards are another example of macrolevel feedback. Macrolevel feedback is sometimes called advisement and also monitoring feedback (figure 1).

Feedback studies in CAI usually involve microlevel feedback. The most commonly researched microlevel feedback forms are confirmation of response feedback (KOR), knowledge of correct response feedback (KCR), and elaborative feedback. KOR or KCR feedback may be given immediately, or after an interval of time. Feedback that is not given immediately after a student's response is termed delayed feedback. Delayed feedback is another form of microlevel feedback. Well designed CAI should include both microlevel and macrolevel feedback are given. This study is concerned with macrolevel feedback, which in this case consists of progress reports presented to students individually.

Learner ability may be an important correlate of course completion. High-ability students are more successful in academic activities and so may approach CAI enrichment with higher motivation. Low-ability learners may have had little academic success, and CAI enrichment offers one more opportunity for embarrassment. High-ability learners may view progress reports as rewarding, since the reports confirm that they are doing well. Low-ability learners may view progress reports as punishing, since the reports may confirm that they are not doing so well. Alternately, CAI offers

low-ability students a chance to make real learning gains that are not norm referenced. Anecdotal evidence from commercial software producers suggests that the attitudes of low-ability students toward academic content improves in CAI environments. CAI progress reports, then, may or may not impact the motivation and attitudes of students of different abilities.


No Feedback
...Instructional treatments that contain no feedback do not provide information either implicitly or explicitly about the accuracy of response or explanation.
KCR Feedback
...informs learners of the correct answer to the question they have just answered.
Informational Feedback
...Informational, often corrective feedback is information that is provided to learners following their response to question within an instructional sequence.
KR Feedback
...tells learners, either explicitly or implicitly whether their responses are correct or incorrect.
Elaborative
...includes those more complex forms of feedback that explain, direct, or monitor. It may or may not be used in conjunction with KR and KCR.
Explanatory
...includes feedback that explains why a correct answer is correct and/or why an incorrect answer is incorrect.
Monitoring
...sometimes called advisement, provides learners with information as to how well they are performing in the lesson.
Directive
...may cue or prompt learners as to strategies to determine the correct answer.

from Patricia Smith (1988)

Figure 1. Concept Map of the Types of Information Feedback

Locus of control (LOC) may also be an important correlate of course completion. Learners with a high LOC take responsibility for their actions. Providing CAI progress reports to high LOC students should reinforce the idea that hard work pays. Low LOC learners feel that they are controlled by circumstance. Providing low LOC learners with progress reports challenges this assumption. These students may attribute high or low scores on activities to external sources and so would disregard the implications of the reports. However, the progress reports also represent real and tangible proof of work, or lack of work. A low LOC learner must confront the fact that the sponsoring organization is interested in individual progress, and that a day of accounting may be near. Since, low LOC respond to external authority, progress reports may increase their rate of course completion. CAI progress reports may or may not impact the motivation and attitudes of students of different LOC.

Can locus of control (LOC) and previous achievement (ACT scores) serve as predictors of course completion? Are students with higher achievement more likely to complete the course? Are students with an internal locus of control more likely to complete the course?

Our experiences with similar at-risk students showed that attendance and course completion would be a problem. In previous years, students have been provided with incentives including clothing, mugs, and group vacation trips. Also, weekly follow-up phone calls and reaffirming letters have been used. Can progress reports improve course completion by these students in this CAI setting? Do progress reports have an effect on instruction? Specifically, do learners that receive progress reports perform better on math post tests than learners that do not receive progress reports?

Subjects

The subjects (n=105) in this study were all eleventh grade at-risk students participating in the Memphis Partners Senior Prep program sponsored by the Holiday Inn Corporation. This program selects students from the Memphis Public School system with below average grade points, and ACT scores below 15. Students are recommended for the program by school guidance counselors and educators. The Memphis Partners program interacts with these students for two years, with the overall goal of improving their self concept, academic standing, and college entrance skills. The program goals are to increase the probability that the students will receive a college education in order to

optimally enter the Memphis economic community. These students are able to "succeed" with just a little help. Seventeen students were omitted from the sample due to lack of scores on either ACT or LOC instruments. This mortality was proportionally divided between the control and experimental groups. The final sample contained eighty-eight (n=88) subjects.

Procedure

Memphis Partners provides summer job placement, job interview skill training, academic instruction, and weekly counselor support with follow-up. Students are required to attend all sessions and must also become involved with group community level volunteer work such as repairing and painting community buildings. The WICAT CAI was part of the academic component and specifically provided language arts and math subject content. The CAI reports showed each activity completed, the percent correct, and the amount of time taken for each activity. The report also showed the date and exact time for starting and finishing each activity.

Students were required to attend five, three hour sessions. The WICAT lab was available five days per week (Monday, Tuesday, Wednesday, Thursday, and Saturday) for five weeks from July 5th until August 8th. Two of the five groups were randomly selected to receive progress reports (figure 2).

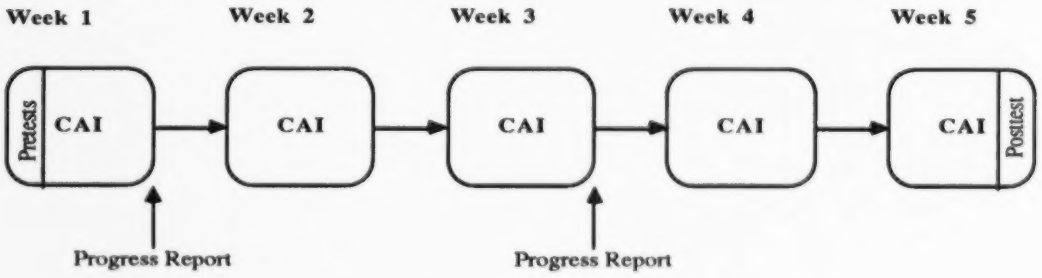


Figure 2. Overview of the Procedure

Progress reports were provided at the first and third sessions (week 1 and week 3) about five minutes before the end of the session. This procedure was designed to emphasize the fact that the computer was keeping extensive records that would be available

to the sponsoring organization. Intentionally, the students were not given time to utilize the progress reports for identification of content weakness, if they should be so inclined. In this study, reports should effect motivation and attendance, but should not directly effect learning performance. Therefore, this study considers the "big brother is watching" motivational potential inherent in CAI progress reports.

Students selected which day they would attend based upon their work schedule. If a student missed a scheduled session, they were encouraged to make it up on an alternate day. Students attending Tuesday, Thursday, and Saturday did not receive progress reports and probably did not know that such records were available. When students missed a session, their counselor would phone and encourage the student to make up the missed time. Before the program began, and then midway through the program, the associate director sent a letter to each student stating that course completion (attendance at five, three hour sessions) was required, and that some penalty would be associated with non-completion.

At the first sessions, students completed a LOC instrument and a math pretest, as well as a standardized reading test. The tests were used to match students to the appropriate CAI lesson sequence.

Experimental Variables

The dependent variables included math posttest and course completion. The variable course completion was assigned 1 for completion and 0 for non-completion. This construct was viewed as dichotomous due to the emphasis placed on course completion by the sponsoring organization. Five was the magic number. Students knew that attendance at even four sessions would be viewed as non-completion. The (45) items on the math posttest were identical to those on the math pretest, and like the pretest, each item was presented in a totally random order by the computer. These items were adapted from example problems in math books from fifth to twelfth grade levels (through Algebra II). The independent variables included the American College Test (ACT) scores, math pretest scores, and the Nowicki-Strickland Locus of Control (LOC) instrument.

Due to the dichotomous dependent variable completion, regular analysis is unavailable due to violation of the assumption of homoscedasticty. In behavioral research, dichotomous variables frequently tend to be non-linear. For these reasons, the non-linear Probit Regression model was selected. The model equation involved the probability of

course completion given the experimental manipulation of receiving or not receiving a progress report and also the continuous variables ACT and LOC as predictors.

Results

Probit and Logit analysis were computed using SPSSx. The Probit analysis proved to be a slightly better predictor of course completion. All reported values are derived from the Probit analysis.

The model with completion as the dependent variable and report, ACT, and LOC as the independent variables showed a goodness-of-fit CHI square of 78.905 with d.f.= 80 and p=.514 indicating that there was a homogeneous distribution of residuals about the regression line, lending support to the model. The parameter estimates for ACT included a regression coefficient of 2.350, s.e. of 0.999, with a resulting student t= 2.350 with d.f=81 which is just significant at the p=.05 level. The parameter estimates for LOC included a regression coefficient of 1.213, s.e. of 0.843, with a resulting student t = 1.438 with d.f. = 81 which is not significant at the p = .05 level. The intercepts for the experimental manipulation report are: with report (1), intercept = 1.649, s.e. = 1.402; and with report (0), intercept = 1.193, s.e. = 1.413. For the group report (0) and report (1), the probability of completion based on the complete model for student scores in the first, second, and third quartile ACT scores are shown in table 1.

Table 1. Probability of completion with and without reports at three different ACT score ranges (with average LOC for that range)

	report	no report
ACT 1st quartile	0.54	0.38
ACT (median)	0.61	0.43
ACT 3rd quartile	0.63	0.46

These results indicate that the group provided with reports were far more likely to complete the course than the group not given reports, with an average effect size of 0.33.

Math pretest achievement data was evaluated for those students who completed the required sessions. Comparison of the report and no report groups' math pretest scores

(table 2) showed a non-significant difference (table 3), suggesting that the partial random assignment to groups was successful.

Math posttests for the report and no report groups showed a significant F ratio at the p = 0.004 level, suggesting that the treatment condition, progress reports, resulted in a significance increase in learning compared to the no report group (effect size: (29.5-24.1)/6.1 = 0.88). These means and F values are summarized in table 2 and 3 below. The math pretest to posttest effect size for the report group was (29.5-26.2)/6.5 = 0.51. The math pretest to posttest effect size for the no report group was 24.1-23.3)/5.1 = 0.16. This indicates that the report group gained substantially more from the instruction than the no report group.

Table 2. Math Test Means and Standard Deviations

	Pretest	Posttest
Report Group (27)	26.2	29.5
	sd 6.5	sd 6.2
No-Report Group (21)	23.3	24.1
	sd 5.1	sd 6.0

Table 3. Pre and Posttest ANOVA Summary (Math)

Pretest	SS	df	MS	F	p
report or no-report	98.6	1	98.6	2.78	0.086
error	1629.3	46	35.4		
total	1727.9	47			
Posttest	**SS**	**df**	**MS**	**F**	**p**
report or no-report	342.7	1	342.7	2.78	0.004
error	1704.6	46	37.1		
total	2047.3	47			

Only those students that completed the program had posttests available for analysis. Differential mortality, if it is present, would produce this significant F in two ways, either by increasing the report groups posttest averages or by decreasing the no report groups posttest averages. Increasing the report group's posttest averages would mean that poor students in the report condition dropped out. Decreasing the no-report group's posttest average would mean that high-ability students in the no-report condition dropped out. The math pretest scores of the students that dropped out were examined. These scores were unrelated to treatments, suggesting that differential mortality due to treatment had not occurred. Therefore, progress reports probably improved math achievement.

Discussion

Providing students with progress reports appears to have a positive effect on students' rate of course completion, and should be recommended for similar groups in similar situations. Also, students with higher ACT scores had a significantly higher rate of completion. Students with higher external LOC scores tended to have a higher course completion rate, though this was not shown to be significant with this sample. Contrary to expectations, these form of progress report improved math posttest scores, perhaps because students with reports worked harder during class.

References

Allessi and Trollip (____)

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